TALANOV, P. I. and L. M. SHCHERB.

Ispol'zovanie chugunnoi i stal'noi struzhki pri plavke v vagranke. (Moskva)
Mashgiz, 1943.   10 p. diagrs.

(Utilization of cast-iron and steel chips in cupola furnaces during the
smelting process.)

DLC: TS231.T3

SO: Manufacturing and Mechanical Engineering in the Soviet Union,
      Library of Congress, 1953.

LADYZHENSKIY, Boris Nikolayevich; TUNKOV, Vladimir Pavlovich; ZVEREV, K.M.,
inzh., retsenzent; KRESHCHANOVSKIY, N.S., kand.tekhn.nauk, retsenzent;
TALANOV, P.I., prof., red.; SIROTIN, A.I., inzh., red.izd-va;
EL'KIND, V.D., tekhn.red.

[Technology of preparing steel castings] Tekhnologiia izgotovleniia
stal'nykh otlivok. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit.
lit-ry, 1958. 255 p.   (MIRA 11:4)
            (Steel castings)

AKSENOV, P.N.; OKROMESHKO, N.V.; STOLBOVOY, S.Z.; TALANOV, P.I., prof.,
   retsenzent; POLOZKOV, M.A., inzh.; SALTYKOV, V.S., inzh.;
   UVAROVA, A.F., tekhn.red.

[Structural design of foundry machinery] Konstruktivnye
chertezhi mashin liteinogo proizvodstva; atlas. Moskva, Gos.
nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1959.   217 p.
                                              (MIRA 12:12)
         (Foundry machinery and supplies)

S/128/60/000/004/005/006
A104/A133

AUTHORS: Talanov, P. I., and Astafurova, N. I.

TITLE: The pecularities of cerium modification of cast iron

PERIODICAL: Liteynoye proizvodstvo, no. 4, 1960, 42-44

TEXT: In view of technological difficulties in the production of mo-
dular cast iron modified with magnesium, experiments are being carried out
to modify cast iron with cerium [Savitskiy, Ye. U - Ref. 1: Redkiye metally
i splavy (Rare Earth Metals and Alloys), Metallurgizdat, 1959; Shkol'nikov,
E. M., Bondarenko, L. G., Zakharov, V. A., Chichagova, N. P. - Ref. 2: "Li-
teynoye proizvodstvo", no. 2, 1960]. During experiments cerium was added as
misch metal (56% Ce, 18% La, up to 1.6% Fe, 0.056% Zn, 0.026% Cl, 0.02% S,
0.015% P, the rest being Nd, Pr, Sm). Cast iron was smelted in a blast cu-
pola, charged until the required chemical composition was attained and over-
heated to 1,500 - 1,550°C in a h-f inductive furnace. Hypoeutectic cast
iron was obtained by the addition of low-carbon steel, a hypereutectic com-
position by the addition of silver graphite. The cast iron was then cooled
to 1,380 - 1,400°C and modified. The misch metal was added with the aid of

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A104/A133

The pecularities of cerium...

a perforated tube. After two minutes the cast iron was stirred, the slag
removed and 0.3% Si75 added. There were no cast iron ejections and its tem-
perature increased by 20 - 30°C. The chemical compositions of the obtained
cast irons and results of mechanical tests are shown in Table 1. It was
found that their tensile strength is higher than their bending strength. At
equal quantities of the modifier the relative hardening of hypereutectic cast
irons is higher than that of hypoeutectic ones. Microstructural tests showed
that the modification with misch metal does not affect the basic metal struc-
ture which consisted of pearlite and 5 - 10% ferrite in all cases. In hypo-
eutectic cast iron spheroidal graphite was found after addition of a 0.3% mo-
difier, in hypereutectic cast iron after 0.5%. However, even the addition
of 0.7% modifier failed to achieve a complete spheroidization of graphite,
due to the increased amount of sulfur and its reaction with cerium. To eli-
minate the effect of sulfur, additional smeltings of cast iron were carried
out under the same conditions as before. The chemical composition and the
results of mechanical tests are given in Table 2. Modification with misch
metal does not affect the casting properties of cast iron. Its fluidity in-
creases and reaches its maximum at 0.5% of misch metal. Larger quantities

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The peculiarities of cerium...   S/128/60/000/004/005/006
                                                  A104/A133

of modifier decrease the fluidity due to the formation of a great amount of
ceric oxide in the metal. Linear shrinkage varied between 0.7 - 1.0%. Since
the modification of cast iron with cerium proved superior to magnesium modi-
fication, further tests included the combined modification with magnesium
and misch metal of desulfurized cast iron. It was established that simul-
taneous addition of solid magnesium and misch metal reduces the pyroeffect.
The chemical composition and the mechanical properties of the tested cast
irons are shown in Table 3. The combined modification with separate addition
of magnesium and misch metal improves the quality of cast iron. Although
the spheroidizing ability of the misch metal is inferior to that of magne-
sium, it neutralizes the adverse effect of titanium, bismuth etc. during the
combined modification. There are 3 tables, 3 figures and 2 Soviet-bloc re-
ferences.

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The pecularities of cerium...

Таблица 1

(1) Добавка мишметалла в %	(2) Химический состав в %						(3) Углеродный эквивалент $C_э$	(4) Предел прочности в кг/мм²	
	$C_{об}$	$C_{св}$	Si	Mn	P	S		(5) при растяжении	(6) при изгибе
—	3,99	0,41	2,17	0,63	0,16	0,08	4,7	10,8	25,1
0,3	3,98	0,50	2,15	0,64	0,15	0,08	4,7	18,2	38,1
0,4	3,98	0,62	2,15	0,63	0,15	0,06	4,7	21,6	42,3
0,5	3,95	0,81	2,11	0,65	0,14	0,05	4,6	26,0	46,3
0,6	3,95	0,88	2,09	0,66	0,15	0,04	4,6	29,0	51,2
0,7	3,94	0,66	2,06	0,65	0,16	0,03	4,6	29,1	56,1
—	2,62	0,71	1,86	0,58	0,12	0,07	3,2	25,8	45,3
0,3	2,62	0,84	1,84	0,60	0,11	0,07	3,2	38,3	62,4
0,1	2,61	0,84	1,85	0,52	0,12	0,07	3,2	39,4	61,0
0,5	2,58	0,90	1,84	0,51	0,13	0,05	3,2	36,0	61,5
0,6	2,56	0,89	1,75	0,52	0,11	0,06	3,1	38,2	60,0
0,7	2,53	0,86	1,80	0,57	0,11	0,06	3,1	38,5	61,0

Table 1:

(1) misch metal addition in %;
(2) chemical composition in %;
(3) carbon equivalent;
(4) strength limit in kg/mm²;
(5) tensile strength limit;
(6) bending strength limit.

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No pecularities of cerian...

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Table 2:

(1) misch metal addition in %;
(2) chemical composition in %;
(3) carbon equivalent;
(4) strength limit in kg/mm^2;
(5) tensile strength limit;
(6) bending strength limit.

Table 2 / Таблица 2

(1) Добавка миш-металла в %	(2) Химический состав в %					(3) углеродный эквивалент $C_э$	(4) Предел прочности в кг/мм²	
	$C_{об}$	Si	Mn	P	S		(5) при растяжении	(6) при изгибе
—	26.5	1.82	0.60	0.10	0.03	3.2	26.4	46.2
0.3	2.63	1.54	0.52	0.10	0.02	3.2	40.4	66.1
0.4	2.65	1.53	0.55	0.11	0.01	3.2	39.3	67.0
0.5	2.58	1.51	0.56	0.10	0.01	3.2	39.5	62.5
0.6	2.56	1.51	0.57	0.11	0.01	3.1	40.1	68.4

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The pecularities of cerium...

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Table 3

Добавка модификатора в %	Химический состав в %					Углеродный эквивалент $C_э$	Предел прочности в кг/мм²	
	$C_{об}$	Si	Mn	P	S		при растяжении	при изгибе
Без модификатора . . .	2,7	2,21	0,53	0,11	0,01	3,4	25,9	46,1
0,4 мишметалла . . .	2,71	2,21	0,60	0,12	0,009	3,4	39,3	66,4
0,4 магния . .	2,69	2,25	0,58	0,10	0,009	3,4	46,1	69,3
0,2 мишметалла + 0,2 магния . .	2,69	2,20	0,53	0,11	0,003	3,4	60,9	71,2

Таблица 3

Table 3:
(1) modifier addition in %;
(2) chemical composition in %;
(3) carbon equivalent;
(4) strength limit in kg/mm^2;
(5) tensile strength limit;
(6) bending strength limit;
(7) without modifier;
(8) 0.4 misch metal;
(9) 0.4 magnesium;
(10) 0.2 misch metal + 0.2 magnesium.

Card 6/6

TALANOV, P.I.; ASTAFUROVA, N.I.

Brittleness of cast iron containing cerium. Lit. proizv. no.3:27-28
Mr '61.   (MIRA 14:6)
                        (Cast iron--Brittleness)
                        (Cerium)

S/148/61/000/005/014/015
E071/E135

AUTHORS: Talanov, P. I., and Astafurova, N. I.

TITLE: An investigation of the technological conditions of the
              inoculation of cast iron with a cerium alloy

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy,
              Chernaya metallurgiya, 1961, No.5, pp. 177-183

TEXT: The influence was investigated of the temperature to
which cast iron was initially heated up and the temperature at which
it was subsequently inoculated with a cerium alloy on the properties
of low sulphur, low phosphorus iron with an eutecticity of 0.9 and
1.0. A cerium alloy FMTs-6 (50.4% Ce, 3.3 Fe, 6.3 Mg, remainder
other rare earth elements) and the following two types of iron:

Eutecticity	C	Si	Mn	P	S
0.9	3.25	2.20	0.50	0.10	0.04
1.0	3.60	2.85	0.60	0.12	0.06

were used for the experiments. Iron was melted in a 50 kg induction
furnace, heated to 1550 °C, transferred into a preheated ladle where
it was retained to a given inoculation temperature (1350, 1400, 1450
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S/148/61/000/005/014/015
E071/E135

An investigation of the technological conditions of the inoculation of cast iron with a cerium alloy

and 1500 °C). The inoculant was introduced on a rod in an amount of 0.5% of cerium alloy and 0.4% of ferrosilicon. The iron was teemed into semis of 50 and 100 mm diameter. The influence of the inoculation temperature was evaluated on the basis of changes in the tensile and bending strength. The coefficients of quasiisotropy were calculated from the equation

$$\frac{\sigma_D}{\sigma_d} = \left(\frac{D}{d}\right)^{-x}$$

where σ_D and σ_d - tensile strength (or bending) in two cross-sections under comparison; D and d - corresponding diameters; x - coefficient of quasiisotropy, designated by a for tensile and by b for bending strength. It was found that an increase in the inoculation temperature to 1400 °C has no practical influence on the properties, but with a further increase in the temperature a considerable increase in the strength characteristics as well as of the coefficients of quasiisotropy a and b was obtained.
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S/148/61/000/005/014/015
E071/E135

An investigation of the technological conditions of the inoculation of cast iron with a cerium alloy

The best results for the latter coefficients were obtained at temperatures of 1450-1470 °C; a further increase gave some deterioration. In cast irons inoculated at 1350 °C no changes in the structure were observed, graphite was present only in plate form. At 1400 °C only a small proportion of the graphite was in circular form; at 1440-1470 °C the whole graphite in both cast irons became globular. At 1500 °C the amount of graphite and the degree of its dispersion decreased. With increasing inoculation temperature the proportion of pearlite in the structure of both cast irons increases and of ferrite decreases, and at 1500 °C the presence of structurally free cementite was observed. The presence of the latter had little effect on the strength characteristics of the iron, but lowered its plasticity, the coefficients of quasi-isotropy and workability. Thus, for cast irons of an eutecticity of 0.9-1.0, inoculation with 0.3% of FMTs-6 alloy and 0.4% of ferrosilicon, for an initial heating temperature of 1550 °C, the optimum inoculation temperature is within the range 1440-1470 °C.
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S/148/61/000/005/014/015
E071/E135

An investigation of the technological conditions of the inoculation
of cast iron with a cerium alloy

To determine the influence of the initial heating temperature,
experiments were carried out in which the iron was heated to 1500,
1550 and 1600 °C, transferred into a ladle, retained to a
temperature of 1460 ± 15 °C and then inoculated. Semis were cast
at a temperature of 1340-1320 °C   With increasing heating
temperature the composition of the iron remained unchanged, with
the exception of carbon (which was decreasing). With increasing
heating temperature, the absolute values of the strength
characteristics change only a little but the coefficients of quasi-
isotropy improve. The positive influence of the preliminary
heating of iron to a higher temperature appears to be associated
with an improvement in the degassing, coagulation and flotation of
inclusions and solution of graphite foam which always interferes
with the formation of regularly shaped globular graphite during
subsequent inoculation. More than 50 industrial heats produced in
various furnaces confirmed the laboratory results. Cupola iron of
a similar composition, the temperature of which in the runner was
Card 4/5

S/148/61/000/005/014/015
E071/E135

An investigation of the technological conditions of the inoculation of cast iron with a cerium alloy

1400-1420 °C could not be inoculated even with 1% of FMTs-6 alloy. Overheating of this iron in an electric furnace to 1550-1580 °C with subsequent inoculation at 1440-1460 °C produced completely globular graphite. When melting of this iron was carried out in an electric furnace, a preliminary heating temperature of 1470-1500 °C was found to be sufficient. It is concluded that a successful inoculation of iron with the cerium alloy can be obtained only at certain temperature conditions of preliminary heating and inoculation; these temperatures differ for a cast iron melted in different furnaces.

There are 5 figures, 4 tables and 3 Soviet references.

ASSOCIATION: Moskovskiy stanko-instrumental'nyy institut
(Moscow Machine Tool Institute)

SUBMITTED: October 11, 1960

Card 5/5

SERGEICHEV, Nikolay Fedorovich; TALANOV, P.I., prof., retsenzent;
     KOCHUROV, A.S., inzh., retsenzent; LOS'KOV, D.I., dotsent, red.;
     ZHIDKIKH, I.A., inzh., red.; BORISOV, A.P., inzh., red.; BLANK,
     E.M., inzh., red.; BOGOSLAVETS, N.P., tekhn. red.

[Manufacture of models] Model'noe proizvodstvo. Moskva, Mashgiz,
1962. 158 p.   (MIRA 15:6)
            (Models and modelmaking)

MARIYENBAKH, L.M.; BARBASHIN, N.N.; kand. tekhn. nauk, dotse;
        retsenzent; TALANOV, P.I., prof., red.

        [Foundry furnaces] Pechi v litelnom proizvodstve. Izd.2.,
        dop. i perer. Moskva, Mashinostroenie, 1964. 355 p.
                                            (MIRA 17:12)

PILIMOV, ...; GLGT ..., A.G.

Wear resistance of grey cast iron during abrasive wear. Lit.
proizv. no.3:25-27 Mr '54.

TALANOV, P.I.; KOTSYUBINSKIY, O.Yu.; ZAL'TSMAN, E.S.

Methods of calculating the cooling of a casting in a multi-layer mold. Izv. vys. ucheb. zav.; chern. met. 7 no.7:195-201 '64. (MIRA 17:8)

1. Moskovskiy stankoinstrumental'nyy institut.

Apparatus for testing materials for wear in reciprocating
motion. Izv. Vrap. Izb. 30 no.6:013-616 '61.   (MIRA 17:5)

1. Moskovskiy stankoinstrumental'nyy institut.

Hygienic factors in the care of moisture remaining of grain
solds. Int. prolzv. no.3 CTb.6 N '62.   (MIRA 12:3)

TALANOV, P.T., prof.; BREDIS, V.E., inzh.

Dimensional connections and errors in sand molds. Lit. proizv. no.9:
6-7 S '65.   (MIRA 18:10)

TALANOV, V.I.; KVASHA, I.R.; MOKSHIN, V.M.

Effect of thermal stresses in green molding mixtures on the
formation of shrinkage cavities. Izv. vys. ucheb. zav.; chern.
met. 8 no.11:148-152 '65.   (MIRA 18:11)

1. Zavod-vtuz pri Moskovskom avtomobil'nom zavode im.
Likhacheva.

TALANOV, S. I., polkovnik meditsinskoy sluzhby

Main problems in the organization of therapeutic and prophylactic services for the troops during camping periods. Voen.-med. zhur. no.5:39-42 My '50.   (MLRA 9:9)
            (MILITARY HYGIENE)

ZHUKOV, A.F., inzh.; TALANOV, S.I., inzh.

Pumping station built of reinforced cement. Biul.tekh.inform.
po stroi. 5 no.10:28 O '59.   (MIRA 13:3)
            (Pumping stations)
        (Reinforced concrete construction)

TALANOV, V. D.

AID Nr. 987-3   11 June

HEAT TRANSFER OF LIQUID METALS IN PIPE FLOW (USSR)

Subbotin, V. I., P. A. Ushakov, B. N. Gabrianovich, V. D. Talanov, and I. P. Sviridenko. Inzhenerno-fizicheskiy zhurnal, v. 6, no. 4, Apr 1963, 16-21.
S/170/63/000/004/002/017

The physics and Power Engineering Institute in Obninsk studied heat transfer from Hg at 18 to 80°C and from NaK alloy (22% Na, 78% K) at 70 to 110°C. Three test sections were used. The first consisted of a polished steel tube (20-mm diameter, 0.3-mm wall thickness) to which copper rings (48-mm diameter) were welded at 1-mm intervals. The thermocouples were located inside the copper rings. The second section contained a nickel tube (12-mm diameter, 0.4-mm wall thickness) also equipped with copper rings. The third section consisted of a machined copper tube with a 40-mm outer and a 20.8-mm inner diameter. Two series of experiments were conducted with NaK: 1) at $470 < Pe < 7900$, with oxide contents in the metal ranging from $3 \cdot 10^{-4}$ to $7 \cdot 10^{-4}$ wt %; 2) at $107 < Pe < 640$, with oxide contents of $1 \cdot 10^{-3}$ to $5.2 \cdot 10^{-3}$ wt %. The results showed that the Nusselt number for Hg in nickel and steel tubes and for NaK in copper tubes is identical. This indicates

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AID Nr. 987-31   11 June

HEAT TRANSFER OF LIQUID METALS IN PIPE FLOW [Cont'd]   S/170/63/000/004/002/017

that thermal contact resistance is practically absent under the conditions studied. Oxides in concentrations from $3 \cdot 10^{-4}$ to $5 \cdot 10^{-3}$ wt % did not affect heat transfer in NaK. The following formula is recommended at $0.002 << Pr << 0.003$ and $20 << Pe << 1000$ for metals containing oxides in concentrations below the solubility limit: $Nu \approx 4.3 + 0.025 \, Pe^{0.8}$. [PV]

Card 2/2

USHAKOV, P.A.; SUBBOTIN, V.I.; GABRIANOVICH, B.N.; TALANOV, V.D.;
        SVIRIDENKO, I.P.

Heat transfer and hydraulic resistance of close-packed bundles
of rods arranged in-line. Atom. energ. 13 no.2:162-169 Ag
'62.   (MIRA 15.8)
        (Heat—Transmission) (Nuclear reactors)

L 5172-66   EPA(s)-2/EWT(m)/EPF(n)-2/T/EWF(t)/EWP(b)   IJP(c)   JD/WW/
ACCESSION NR: AT5022450   JG/GS   UR/0000/65/000/000/0001/0022

AUTHOR: Subbotin, V. I.; Ushakov, P. A.; Zhukov, A. V.; Talanov,
V. D.; Kudryavtseva, L. K.; Sviridenko, Ye. Ya.; Vasil'yeva, L. V.

TITLE: Investigation of the temperature distribution in core and
shield elements of BN-350 reactor by means of experimental models

SOURCE: Obninsk. Fiziko-energeticheskiy institut. Doklady, 1965.
Eksperimental'noye issledovaniye na modelyakh poley temperatury
teplovydelyayushchikh elementov aktivnoy zony i ekrana reaktora
BN-350, 1-22

TOPIC TAGS: nuclear power reactor, fast reactor, liquid metal
cooled reactor

ABSTRACT: The distribution of temperatures in various parts of a
350 Mw fast-neutron sodium-cooled reactor was investigated by means
of two special experimental models. The first model consisting of
two loops was similar to the core of the BN-reactor while the second
model was arranged for investigation of heat transfer in the shield-
ing area. Particular attention was given to the centrally and
peripherally located fuel elements that is to the fuel assemblies
submitted to different heat transfer conditions. The core primary
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L 5172-66

ACCESSION NR: AT5022450

loop was cooled by sodium while a sodium-potassium compound was used as coolant for the secondary core loop as well as for fuel elements placed within lateral shields. The core model consisted of 37 tubes of which 34 tubes were provided with special welded fins. The shield model had an assembly of 19 tubes. A detailed description of the experiments was given and the results were analyzed. The irregularities in temperature distribution were graphically presented in 10 figures. It is proposed to resume the research on temperatures by using new models because the evaluation of temperature ranges and gradients on outer peripheral elements was not sufficiently reliable. Introductory information is also given on BN-350 reactor as well as on some heat transfer problems. Orig. art. has: 3 diagrams and 10 graphs.

ASSOCIATION: none

SUBMITTED: 00   ENCL: 00   SUB CODE: NP

NO REF SOV: 000   OTHER: 000

Card 2/2

L 30391-66   ENT(l)   IJP(c)   CG/WW
ACC NR: AP6020792   SOURCE CODE: UR/0386/66/003/012/0471/0476

AUTHOR: Bespalov, V. I.; Talanov, V. I.

ORG: Scientific-Research Radiophysics Institute (Nauchno-issledovatel'skiy radio-fizicheskiy institut)

TITLE: Filamentary structure of light beams in nonlinear liquids

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 3, no. 12, 1966, 471-476

TOPIC TAGS: light transmission, light theory, light polarization, laser optics, laser modulation, LIQUID PROPERTY, PERTURBATION

ABSTRACT: The authors present a theory of formation of self-focusing light fila-ments in liquids, first described by Pilipetskiy and Rustamov (Pis'ma ZhETF v. 2, 88, 1965). It is shown that in a nonlinear dielectric, amplitude phase perturba-tions of a plane electromagnetic wave bring about its decay into individual beams having different self-focusing lengths, depending on the scale of the initial per-turbation. In this case there exists a characteristic fastest-focusing scale, determined by the nonlinearity coefficient of the wave. The development of small perturbations of a plane wave into a decay is traced, and the stability of the

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ACC NR: AP6020792   4

perturbations is analyzed. The buildup of the instability caused by these per-
turbations is shown to depend on the width of the initial perturbation region, on
the anisotropy caused by the incident wave, and on the random inhomogeneities of
the medium in which the wave propagates. The results are of importance in connec-
tion with possible structural changes that can occur in the field radiated by a
laser, especially if the effect of nonlinearity of the active medium is aggravated
by the presence of other nonlinear materials in the cavity (such as a saturating
shutter). The authors thank A. V. Gaponov and M. A. Miller for a discussion of
the results and V. N. Gol'dberg and R. E. Erm for the electronic computer calcula-
tions. Orig. art. has: 2 figures and 6 formulas.   [02]

SUB CODE: 20/   SUBM DATE: 12Apr66/   ORIG REF: 006/   OTH REF: 004/
ATD PRESS: 5017

Card 2/2   ((

L 31125-66

ACC NR: AP6011396   SOURCE CODE: UR/0057/66/036/003/0497/0507

AUTHOR: Averbakh, V. S.; Vlasov, S. N.; Talanov, V. I.

ORG: Scientific-Research Radiophysics Institute at the Gor'kiy State University im.
N. I. Lobachevskiy (Nauchno-issledovatel'skiy radiofizicheskiy institut pri
Gor'kovskom gosudarstvennom universitete)

TITLE: An open resonator with an arbitrarily located stop

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 3, 1966, 497-507

TOPIC TAGS: laser, laser theory, resonator, electromagnetic field

ABSTRACT: The authors consider the normal modes and losses in an open resonator con-
sisting of two spherical mirrors with a single beam-limiting diaphragm located at an
arbitrary position on the optical axis. Such a resonator is regarded as a model of
a laser with external mirrors in which the beam is limited by the dimensions of the
working medium. All dimensions are assumed to be sufficiently large so that geomet-
rical optics can be employed. The conditions for focusing are specified by the two
parameters $g_i = 1 - L/R_i$ (i = 1, 2), where L is the distance between the mirrors and
R_i is the radius of curvature of the i-th mirror. The effect of misalignment of the
mirrors is taken into account. Two types of diaphragm are considered: a perfectly
transparent rectangular aperture, and an absorbing aperture in which the transmission
is a Gaussian function of the distance from the axis. The basic equations are taken

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L 37936-66

ACC NR: AP6014253   SOURCE CODE: UR/0109/66/011/005/0943/0945

AUTHOR: Averbakh, V. S.; Vlasov, S. N.; Talanov, V. I.

ORG: none

TITLE: Nonaxial-mode discrimination in open quasi-optical systems

SOURCE: Radiotekhnika i elektronika, v. 11, no. 5, 1966, 943-945

TOPIC TAGS: mode discrimination, quasioptic system, millimeter wave, resonator

ABSTRACT: A highly mode-selective open-resonator system is considered. If the dimensions of a two-concave-mirror system are so proportioned that the caustic surfaces are formed only for the dominant (axial) mode, only this mode will be located near the system axis. Or else: any infinite-nonplanar-mirror resonator can be conformally mapped into a plane-parallel system filled with a nonhomogeneous dielectric. These considerations were verified by a numerical solution of an integral equation that described the field in a two-dimensional resonator; selectivity curves are shown. A qualitative corroboration was obtained from an experimental study of a resonator with 200-mm diameter mirrors operating at an 8-mm wavelength. "The authors wish to thank L. V. Piskunova and V. F. Morozov for their work on an electronic computer." Orig. art. has: 3 figures and 1 formula.

SUB CODE: 20, 09 / SUBM DATE: 16Aug65 / ORIG REF: 004

Card 1/1   UDC: 621.372.4

TALANOV, Y.I.

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621.372.2   3030
Electromagnetic Surface Waves
Guided by a Boundary with Small
Curvature.—M. A. Miller & V. I.
Talanov. (Zh. tekh. Fiz., Dec. 1956,
Vol. 26, No. 12, pp. 2755-2765.) The
theory developed indicates the existence of
(a) three-dimensional surface waves which
maintain their surface characteristics
independent of the radius of curvature, and
(b) two-dimensional waves which are partly
radiated even at small curvatures of the
boundary. Curves showing the decrease of
the attenuation of the latter type of wave
with the increase in wave retardation and
with the decrease in the curvature of the
guiding surface are given. Several surface
waveguides are illustrated.

SUBJECT   USSR / PHYSICS   CARD 1 / 2   PA - 1832
AUTHOR   MILLER,M.A., TALANOV,V.I.
TITLE   Electromagnetic Surface Waves directioned by a Boundary with a
                Slight Curvature.
PERIODICAL   Zurn.techn.fis, 26, fasc.12, 2755-2765 (1956)
                Issued: 1 / 1957

In the paper by the same authors, Zurn.techn.fis.25, fasc.11, 1810 (1955) the
properties of electromagnetic surface waves directioned by flat boundaries were
investigated. This problem may be looked upon as a limiting case of the problem
concerning waves directioned by a cylinder (in the case of an infinite value of
the ratio between the cylinder radius r_1 and the wave length λ). The present
work aims at investigating this boundary transition more closely than had been
the case in the previous work. It was furthermore important to evaluate the dis-
tortions which were carried into the surface field (in the case of high but
finite values of the curvature radius of the directioning boundary). Apart from
the practical point of view, this is of interest also as a matter of principle,
because there exists a certain class of waves which in the vicinity of a direc-
tioning boundary lose their surface character even if the curvature be ever so
small. At first the equation for the wave numbers is set up.For this purpose
a cylinder with any radius $r=r_1$, on the surface of which homogeneous boundary
conditions prevail, is investigated. The problem consists in finding the radicals
of the equations which were set up. With any value of the parameter $p=kr_1$ these
equations can be solved only numerically; if $p_1 = kr_1 \gg 1$ $(r_1 \gg \lambda)$ is

AUTHOR : Talanov, V.I.

    "A Method Solving the Problem of Excitation of Surface Waves Over and
Impedance Surface,"
A-U Sci Conf dedicated to "Radio Day," Moscow, 20-25 May 1957.

PERIODICAL: Radiotekhnika i Elektronika, Vol. 2, No. 9, pp. 1221-1224,
        1957,   (USSR)

TILAEV, T. I.

T. I. TILAEV, "On electromagnetic wave reflection from a plane with variable surface impedance." Scientific Session Devoted to "Radio Day", May 1958, Tr. nauserving t, Moscow, 9 Sep. M

The problem is analyzed of the reflection of two-dimensional electromagnetic waves from a plane whose surface impedance is given as

$$Z(z) = \frac{P_m(z)}{P_n(z)}$$

where z is a coordinate on the plane, $P_m(z)$ is a polynomial of degree m with complex coefficients.

It is shown that the function $\phi(h)$, conjugate to the Fourier function $\tau(z)$ of the field distribution on the plane, satisfies an ordinary differential equation with variable coefficients under certain additional assumptions.

The case of a fractional-linear dependence of $Z(z)$ is investigated, hence, a rigorous expression for the reflected field is obtained. The field of a given linear source above the plane is computed in the case of a linear dependence of $Z(z)$.

ALABIN, V. I.

V. I. TALANOV, "On electromagnetic wave diffraction on a surface
impedance step in a waveguide." Scientific Session Devoted to "Radio Day",
May 1958, Trud.nervizdat, Moscow, 9 Sep. 58

An exact solution is obtained of the problem of two-dimensional
electromagnetic wave diffraction on a surface impedance step in a wave-
guide formed by two parallel planes, an impedance and a perfectly con-
ducting. Expressions are presented for the fields the reflection and
transformation coefficients. A generalization is made to the three-dimen-
sional field case.

TALANOV, V. I.

Diffraction of electromagnetic waves by surface impedance shelves in wave guides. Izv.vys.ucheb.zav.; radiofiz. 1 no.3:64-72 ' 58.
(MIRA 12:1)

1. Issledovatel'skiy radiofizicheskiy institut pri Gor'kovskom universitete.
(Radio waves--Diffraction) (Wave guides)

"The Influence of Random Errors in the Source Distribution on the
Radiation Pattern of Traveling Wave Antennas."

The author showed that, in case of continuous and also in case of discrete
radiation element distribution, phase speed deviations of a wave at an antenna, limit
the maximum possible gain of the latter when increasing its length. For the second
case, such current correlation functions in radiators were found, with consideration of
their mutual influences, caused by the principal wave in the line. Finally, expressions
for the average antenna radiation pattern were presented.

report presented at the All-Union Conference on Statistical Radio
Physics, Gor'kiy, 13-18 October 1958. (Izv. vyssh uchev zaved-Radiotekh.,
vol. 2, No. 1, pp 121-127)   COMPLETE card under SIFOROV, V. I.)

AUTHOR: Talanov, V. I.   57-28-6-23/34

TITLE: The Excitation of Surface Waves by the Open End of a Plane Waveguide
                (Vozbuzhdeniye poverkhnostnykh voln otkrytym kontsom ploskogo
                volnovoda)

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 6,
                pp. 1275 - 1285 (USSR)

ABSTRACT: The present paper solves the problem of the diffraction of
                electromagnetic waves on the open end of a plane waveguide
                located above the moderating structure by the method of
                functional equations. It was assumed that the latter was ex-
                tended to the interior of the waveguide. The following for-
                mulae were determined: 1) A formula for the field of the sur-
                face wave. In practical calculations formula (3.15) can be used
                with sufficient accuracy at any values of D:

$$T = 2 \text{ sh } \bar{p}_0 \text{ th } \bar{p}_0 e^{-q} \; \frac{2 \Gamma_0 \; \Gamma_0 + D}{\Gamma_0 + \Gamma_s \; \Gamma_s + D} \; e^{-(\Gamma_0 - \Gamma_s)} \qquad (3.15)$$

Card 1/4   2) A formula for the radiation field. At $Q_1 = 0$ the formula for the

The Excitation of Surface Waves by the Open End of a   57-28-6-23/34
Plane Waveguide

radiation diagram of the open end of the flat waveguide of
an ideally conductive lower wall is obtained (Reference 3)

$$W(\theta) \sim \frac{\sin (D \sin \theta)}{\sin \theta} e^{D \cos\theta} \qquad (3.20)$$

3)Formulae for the waves within the waveguide, which are re-
flected from its open end. From a comparison between the for-
mulae

$$\left| R_o \right|^2 = (\frac{\Gamma_o + D}{\Gamma_s + \Gamma_o})^2 \frac{1}{ch^2 \bar{p}_o} e^{-2 \Gamma_o} \qquad (3.21)$$

and $\qquad \left| R_o \right|^2 = e^{-2D}$

it may be seen that, in the first case, with a fixed Q_1, the
reflection coefficient decreases considerably more rapidly with
an increase of D than in the second case. These results are
obvious and can be explained by the fact that in a waveguide
Card 2/4   with an impedance base the field closely adjoins the latter.

The Excitation of Surface Waves by the Open End of a   57-2C-6-23/34
Plane Waveguide

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Therefore the excitation caused by the upper wall manifests
itself comparatively little. Thus, in the case of the exci-
tation of surface waves by the open end of a waveguide and if
the moderating system has been extended into the interior
of the waveguide the degree of excitation of the wave is de-
termined by the amount of moderation and by the position of
the upper wall of the semiconductor. It will be all the stronger
the more open the waveguide will be in the case of a suitable
moderation.In practice, it is not advisable to choose a very
large opening for the semiconductor because of the possible
occurence of propagating higher types of waves in connection
with the excitation of the waveguide. If the fields of the
highest types are known, the corresponding coefficients of
their transformation into surface - or space waves can also
be calculated according to the general formulae. The results
of this work may prove useful in the course of the technical
investigation of the antennae for surface waves. The author
thanks M. A. Miller and A. V. Gaponov for their discussion

The Excitation of Surface Waves by the Open End of a   57-26-6-23/34
Plane Waveguide

        of results. There are 7 figures and 5 references, 3 of which are
        Soviet.

ASSOCIATION: Gor'kovskiy gosudarstvennyy universitet im. N. I. Lobachevskogo
        (Gor'kiy State University imeni N. I. Lobachevskiy)

SUBMITTED: July 22, 1957

        1. Electromagnetic waves—Diffraction   2. Electromagnetic
        waves—Mathematical analysis   3. Waveguides—Mathematical
        analysis   4. Electromagnetic waves—Excitation

Card 4/4

TALANOV, V. I., Candidate Phys-Math Sci (diss) -- "Some problems of diffraction

and excitation of electromagnetic waves in decelerating systems". Gor'kiy, 1959.

9 pp (Min Higher Educ USSR, Gor'kiy State U im N. I. Lobachevskiy), 150 copies

(KL, No 25, 1959, 127)

06344
SOV/141-2-1-16/19

AUTHOR: Talanov, V.I.

TITLE: Electromagnetic Surface Waves in Systems with Non-uniform
           Impedances

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika,
           1959, Vol 2, Nr 1, pp 132 - 133 (USSR)

ABSTRACT: It is known (M.A. Miller - Ref 1) that non-uniformity in
           surface impedance can generally lead to conversion of
           energy from a guided to a radiated form. There are also
           cases where surface waves can also exist, analogous to
           the uniform-impedance types but orthogonal to them. The
           example considered is a two-dimensional wave confined
           between two planes at an angle $0 < \varphi_0 \leqslant 2\pi$. If, in

           cylindrical coordinates the surface impedances are inverse
           functions of r then the solution to the wave equation is
           Eq (1) in terms of Hankel functions whose order is found
           from the characteristic Eq (2). The asymptotic form of
           the solution for large r is Eq (4). This form of geo-
           metry offers the simplest model and enables an aerial
           aperture to be designed in the same way as for an ordinary
Card1/2   horn.

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SOV/141-2-1-16/19
Electromagnetic Surface Waves in Systems with Non-uniform Impedances

There are 3 references, 2 of which are Soviet and 1 English.

ASSOCIATION: Issledovatel'skiy radiofizicheskiy institut pri
                Gor'kovskom universitete (Radiophysics Research Institute
                of Gor'kiy University)

SUBMITTED: December 17, 1958

Card 2/2

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SOV/141-2-3-15/26

AUTHORS: Talanov, V.I. and Sheronova, N.M.

TITLE: The Influence of Random Errors in the Distribution of Sources on the Radiation Patterns of Travelling-wave Aerials

ABSTRACT: Expressions are obtained for the deviation of the mean diagram from its nominal value caused by random perturbations in amplitude, phase and phase velocity of the current waves in the aerial. It is shown that errors in phase velocity limit the possibilities of obtaining highly-directive patterns by increasing dimensions. The analogous problem for lenses and mirror aerials has been treated earlier (Refs 1-5). In a progressive-wave aerial the pattern is influenced by errors in the feeder and in the radiating elements themselves. The effects are more serious than in lenses and mirrors since the influence is not merely local but can affect even those parts of the structure which are otherwise perfect. The

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SOV/141-2-3-13/26

The Influence of Random Errors in the Distribution of Sources on
the Radiation Patterns of Travelling-wave Aerials

example is taken of a linear aerial whose parameters are
slowly varying functions of the coordinate z , the source
distribution being Eq (1). The radiation pattern (in
power) of an aerial of length 2L , with this distribution,
is given in Eq (2). The deviation in the pattern caused by
random errors in current distribution is given by Φ_{pac} :
the "scattered power", in Eq (6) where $K(z,z')$ is the
autocorrelation function. It is reckoned that the
dimensions of the irregularities in the feeder are large
compared with the wavelength. The amplitude and phase
components of error are given by Eqs (8) and (9), respec-
tively. The latter equation may be considered in two forms,
referring to local phase errors, Eq (10), and non-local
phase errors, Eq (11). The effects of these errors on the
diagram are calculated on the assumption that they are
uncorrelated. The relevant correlation functions are
Eqs (12), (13) and (14). For amplitude errors the scattered
power is Eq (15), where the function $f(t, \xi)$ is given in
Card 2/4 Figure 1. For a given length and mean dispersion the

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The Influence of Random Errors in the Distribution of Sources on
the Radiation Patterns of Travelling-wave Aerials

scattered power and the directivity increase with the ra us
of correlation. The diagram remains symmetrical. The
relative distortion of the diagram is inversely proportional
to L for a fixed error. The corresponding equation for
local phase error is Eq (16) and the conclusions are
similar. For non-local phase error the scattered power is
Eq (20), the associated function being plotted in Figure 2,
in two parts. One part, $f_1(\xi)$, is negative and thus
adversely affects the pattern. The scattered power is a
cubic function of L and thus increases faster than the
nominal power in the diagram. There would therefore seem
to be a maximum useful size of aerial limited by errors in
phase velocity. The limiting length L_{mpe} is given on
p 429. A lugger aerial has a poorer performance. At
X-band frequencies, with 0.05 mm tolerances and correlation
radius of $10\lambda_c$, the maximum aerial size (for this form of
aerial) would be ~35 m.

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The Influence of Random Errors in the Distribution of Sources on
the Radiation Patterns of Travelling-wave Aerials

There are 2 figures and 8 references, 4 of which are Soviet,
2 English, 1 French and 1 Italian.

ASSOCIATION: Issledovatel'skiy radiofizicheskiy institut pri
Gor'kovskom universitete(Radiophysics Research Institute
of Gor'kiy University)

SUBMITTED: March 2, 1959

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S/141/59/002/06/008/024
E192/E382

AUTHOR: Talanov, V.I.

TITLE: The Excitation of Dielectric Waveguides

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika,
             1959, Vol 2, Nr 6, pp 902 - 910 (USSR)

ABSTRACT: The system considered is illustrated diagrammatically in
           Figure 1. A dielectric plate having a thickness d and
           parameters ε_1 and μ_1 is situated on an ideally
           conducting plane x = 0 . The exciting waveguide is
           formed by the plane x = 0 and an ideally conducting
           semi-plane x = d , which is situated directly above the
           dielectric plate. An ideally conducting screening sheet
           is situated at a distance D from the plane
           x = 0 (x = D > d) . By considering only the H-waves, the
           diffraction current $I_z = I(z)$, excited by the incident
           wave in the semi-plane x = d , is expressed by:

$$I(z) = \int_{-\infty}^{\infty} F(h) e^{-ihz} dh \qquad (1.1)$$

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The Excitation of Dielectric Waveguides

The component H_y of the magnetic field of this current in the dielectric and above the dielectric is described by Eq (1.3) and Eq (1.4). The remaining parameters of Eq (1.2) are defined by Eq (1.5). The function $F(h)$ of Eq (1.1) can be found from the system of integral formulae defined by Eq (1.6), where I_n is the current amplitude at the plane $x = d$. The functions $L(h)$ are defined by Eqs (1.7) - (1.10). Consequently, the solution of Eqs (1.6) is in the form of Eq (1.12). If equations of the type (1.8), (1.9) and (1.10) are equated to 0 , they are equivalent to Eqs (2.1), (2.2) and (2.3). The solutions of Eqs (2.1) and (2.2) are in the form of Eqs (2.4) and (2.5). Eqs (2.1), (2.2) and (2.3), together with Eq (1.5) determine the propagation constants of the proper waves in regular waveguides (Regions 1, 2 and 3 in Figure 1). The H_y components of the free waves in these waveguides (see Figure 1) are expressed by Eq (2.7). If the field components are normalized in accordance with Eq (2.8), their amplitudes are expressed by Eq (2.10). In

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The Excitation of Dielectric Waveguides

order to determine the auxiliary functions L_1 and L_2 it is necessary to consider separately each factor in the expression for $L(h)$ (see Eq 1.11). The auxiliary functions can then be expressed by Eq (3.6). By substituting the solution for the function $F(h)$ into Eq (1.2), it can be seen that the unique particular points of the sub-integral expressions in Eq (1.2) are the simple poles in the roots of the characteristic Equations (2.1) - (2.3). On the basis of the Cauchy theorem the fields in the waveguides 1, 2, 3 (Figure 1) are given by Eqs (4.4) - (4.6). The transformation coefficients T can be expressed by Eqs (4.7). Figure 4 shows the dependence of the square of the modulus of the transformation coefficient T_{oo} on $\xi = (D - d)/d$. Figure 4 shows also the reflection coefficients R_{oo}. The same quantities can also describe the system represented in Figure 5a, where a flat dielectric waveguide, having a

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The Excitation of Dielectric Waveguides

thickness 2d is excited by a screened waveguide. The
Eq (4.7) can therefore be employed for an approximate
evaluation of the excitation of opened dielectric wave-
guides. The above method of analysis can also be used
in the evaluation of the excitation of slow H-waves in
a general case, when the upper wall of the exciting wave-
guide is fitted above the surface of the dielectric plate.
The problem of the E-wave can be solved in a similar
manner. There are 5 figures and 8 references, 3 of which
are English and 5 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut
pri Gor'kovskom universitete (Scientific-research
Radiophysics Institute of Gor'kiy University)

SUBMITTED: June 13, 1959

Card 4/4

9,1800

AUTHOR: Talanov, V. I.

TITLE: Radiation of Surface-wave Antennae With Periodically
            Changing Surface Impedance

TEXT: The characteristics of two-dimensional TM-waves of
the surface type are considered. The waves propagate over an
impedance plane (Fig. 1) which is characterised by the
following boundary condition:

$$E_z = Z(z)H_y \qquad (1.1)$$

and has a purely reactive surface impedance expressed by:

$$Z(z) = iZ_o(Q_o + Q_1 \sin (\beta\ kz)) \qquad (\text{Re } Z = 0) \qquad (1.2)$$

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Radiation of Surface-wave Antennae With Periodically Changing Surface Impedance

where Q_o and Q_1 are positive constants,

$\beta = 2\pi/kD$,
$Z_o = \sqrt{\mu_o/\varepsilon_o}$,
$k = \omega\sqrt{\varepsilon_o\mu_o} = 2\pi/\lambda$,

D is the modulation period of the impedance, while

ε_o, μ_o are the parameters of the medium occupying the semispace $x > 0$.

The components of the magnetic field $H_y \equiv H$, which can be used to express the remaining components of the field, can be written as an infinite sum of spatial harmonics:

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$$H(x, z) = \sum_{n=-\infty}^{\infty} a_n e^{-ih_n z - i\varkappa_n x} \qquad (1.3)$$

where h_n and $\varkappa_n$ are defined by Eqs. (1.4). On the basis
of Eqs. (1.3) and (1.1), it is found that the amplitude a_n
of the spatial harmonics can be found from an infinite system
of equations; this is represented by Eq. (1.5), where
various symbols are defined by Eqs. (1.6). Eqs. (1.5) can
be written in the form of recurrence equations (1.7), where
T_n is defined by Eq. (1.8). From Eq. (1.7) it follows that
the asymptotic value of T_n is given by Eqs. (1.9). The
recurrence relations can also be represented by continuous
fractions, these are defined by Eqs. (1.11). From Eqs. (1.11)
it is found that for $m \to \infty$, the characteristic equation
for determining the wave number γ_0 for the zero harmonic
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Radiation of Surface-wave Antennae With Periodically Changing
Surface Impedance

is given by Eq. (1.12), where $\xi = -B^2$ and n is an
integer. If γ_o is regarded as that value of the root at
which for $\xi \to 0$, $\gamma_o = \gamma_s = \sqrt{1 + Q_o^2}$, Eq. (1.12) can be
written as Eq. (1.13) provided $n = 0$. Eq. (1.13) can be
solved by the method of successive approximations.
For $\xi \ll 1$ (low modulation) the zero and the first
approximations for Eq. (1.13) are given by Eqs. (1.14) and
(1.15). The expressions for γ_o are therefore in the form
of Eqs. (1.16) and (1.17), where $\sigma_o^{(1)}$ is defined by
Eq. (1.18). In general, $\gamma_o^{(1)}$ can have a real and imaginary
component as defined by Eq. (1.19). These components can be
evaluated from Eqs. (1.20) and (1.21). The functions F and
G in these equations are plotted in Figs. 2 and 3. It is
of interest to investigate the field in the system in the
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vicinity of the critical frequencies of π- and 2π-
oscillations. The oscillations of the π-type obey the
conditions of Eq. (1.23). The characteristic equation which
determines the frequencies of π-oscillations is in the form
of Eq. (1.26). The oscillations of 2π-type obey the
relationships expressed by Eq. (1.32) and the characteristic
equation for determining the critical frequencies of these
oscillations is in the form of Eq. (1.34). Eqs. (1.21) for
this case can be written as Eqs. (1.39) and (1.40). The
above results can be used to analyse a two-dimensional
radiation source which is in the form of a section of
impedance plane $0 \geqslant z \geqslant E$ and has a sinusoidally
varying surface impedance. It is assumed that a surface wave
propagating in the $+z$-direction is generated at the radiator.
If the region of the parameters lying in the vicinity of
2π-oscillations is neglected, the distribution of the
equivalent sources at the radiating antenna can be described by:
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$$\Phi(z) = \sqrt{\xi} \, \exp\left(-i\gamma_{-1r}kz - \gamma_{0im}kz\right) \qquad (2.1)$$

where γ_{-1r} and γ_{0im} are determined from Eqs. (1.20)
and (1.21). If Q_1 changes comparatively slowly, Eq. (2.1)
can be written as Eq. (2.2), where various parameters are
defined by Eqs. (2.3). The amplitude distribution is
assumed to be in the form of Eq. (2.4). If the function
$A(z)$ in Eq. (2.4) is given, this represents an equation
with respect to $\xi(z)$ and its solution is in the form of
Eq. (2.5). Now, the source distribution function can be
expressed by Eq. (2.6), where $\psi(z)$ is defined by
Eq. (2.7). The maximum phase distortion of the antenna

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occurring at z = L is defined by Eq. (2.8) and the
efficiency of the antenna is expressed by Eq. (2.9). If the
amplitude has a uniform distribution, it is shown that the
modulation law of the impedance should be in the form of
Eq. (2.11). where η is expressed by Eq. (2.12). The
dependence of ζ/ζ_0 on z/L (see Eq. 2.11) for various

values of η is illustrated in Fig. 4. The sinusoidal
amplitude distribution can be secured if the impedance
modulation function is in the form of Eq. (2.13), where

$\eta = kGA_o^2 L$ Graphs of this modulation function for various

values of η are shown in Fig. 5. The above analysis does not
take into account the absorption of the surface-wave energy.
This can be taken into account by assuming that the wave
damping coefficient $k\delta$, which is due to the energy
dissipation in the slow-wave system, is independent of the

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Radiation of Surface-wave Antennae With Periodically Changing
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depth of the modulation and is solely determined by the values
of the parameters of the system. In this case, the distribution
of the first spatial harmonic along the antennae can be
described by Eq. (2.14). The impedance modulation
ξ (z) is now given by Eq. (2.15) and the phase distortion
is expressed by Eq. (2.16). In this case, the modulation
function for a uniform amplitude distribution is represented
by Eq. (2.20) and the limiting value of the antenna efficiency
is given by Eq. (2.21). This equation is plotted in Fig. 6.
The modulation function of Eq. (2.20) is plotted in Fig. 7.
From the above analysis it is seen that by using the method of
spatial harmonics for the solution of the problem of the surface-
wave propagation above a plane with sinusoidally varying surface
impedance it is possible to determine all the formulae
necessary for evaluating the amplitude-phase distributions
of the field in antennae with surface waves Analogous

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Radiation of Surface-wave Antennae With Periodically Changing
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procedures can be applied to the evaluation of the fields
in cylindrical antennae with periodically varying parameters.
After submission of the paper to the editor the author was
informed by A.A. Oliner that a similar problem was investigated
by him with A. Hessel and the results obtained were presented
at a symposium on electromagnetic theory in Toronto in
June, 1959. The author points out that, unfortunately, he
could not become acquainted with the material of this
symposium until after the proof-reading of his paper.
There are 7 figures, 3 references: 1 English, 1 French
and 1 Soviet.

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9, 3700

33139
S/141/61/004/005/001/...
E039/E135

AUTHORS: Miller, M.A., and Talanov, V.I.

TITLE   The use of the surface impedance concept in surface
              electromagnetic wave theory. (Review)

PERIODICAL   Izvestiya vysshikh uchebnykh zavedeniy,
              Radiofizika, v.4, no.5, 1961, 795-830

TEXT: This is a comprehensive review paper which deals with
some general questions on the way in which the theory of surface
electromagnetic waves is related to impedance and on the guiding
properties of boundaries.   It is assumed that in the general
case surface impedance may possess spatial dispersion.   The
value of this in the study of free waves, as well as for the
solution of the problem of surface field excitation by means of
various sources, is shown.   The work is discussed under four
main headings, as follows.
1. Free surface waves.   This section is divided into ten parts
and starts with a discussion on surface impedance.   In the case
of a closed boundary surface the tangential form of the vector
field is given as
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The use of the surface impedance ...   S/141/61/004/005/001/021
E039/E135

$$E_i = \sum_{k=1}^{2} Z_{ik} \left[\frac{nH}{} \right]_k \qquad (1\ 1)$$

where $\underline{n}$ is normal to the surface, ik is the characteristi
index of orthogonal coordinates in the direction of the surface.
The tensor $Z_{ik} = R_{ik} + jX_{ik}$ in a practical rationalised system
of units (used in this survey) has the dimensions of impedan
and is called the surface impedance tensor. It is shown that
surface waves guided by a plane boundary become plane
heterogeneous waves and for cylindrical surfaces cylindrical
heterogeneous waves. A large part of the work on surface waves
is devoted to the guiding properties of surfaces. The basic
properties of surface waves are discussed in detail. Briefly
the condition for the existence of surface waves near a plane
$z = 0$ leads to the relation:

$$Re_\gamma = -Im\gamma > 0 \qquad (1\ 17)$$

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The use of the surface impedance ...   S/141/61/004/005/001/021
E039/E135

The phase velocity of such waves is always less than the velocity of propagation (for a two dimensional plane the velocity of light

$c = 1/ \sqrt{\varepsilon\mu}$). Discarding non-essentials the solution of the equation for local fields for $\tilde{\gamma}^2 = -1$ gives:

$$\tilde{\gamma}\pm = \tilde{M} \pm \sqrt{\tilde{M}^2 + N} \qquad (1.15)$$

If $\tilde{M}$ and N are considered real it is comparatively simple to classify all possible forms of surface waves. Fig. 1 shows five different regions for the parameters $\tilde{M}$ and N. In the first three the condition (1.13) is satisfied. In region I ($N > 0$) there is only one positive root ($\tilde{\gamma}_+ > 0$, $\tilde{\gamma}_- < 0$) and only one type of surface wave is possible. In region II.

($\tilde{M}^2 > -N$, $N < 0$, $\tilde{M} > 0$) the simultaneous existence of two propagated waves is permitted. In region III

($\tilde{M}^2 < -N$, $N < 0$, $\tilde{M} > 0$) there are two complex roots with positive real parts. The regions IV and V correspond to the propagation of non-localised fields. In IV ($\tilde{M} < -N$, $N < 0$, $\tilde{M} < 0$)

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The use of the surface impedance ...   S/141/61/004/005/001/021
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both roots of Eq (1.15) are complex, and in V ($\tilde{M} > -N$, $N < 0$, $\tilde{M} < 0$)
real and negative. This illustrates the possible forms of
surface waves and shows the critical values of parameters
appropriate to transitions from one region to another. The
review continues with a discussion on surface impedance at a
plane boundary and on systems with cylindrical boundaries. The
latter condition is qualitatively analogous to the plane boundary
case. The case of surface waves on a heterogeneous boundary is
considered and it is shown that for the general case one must
resort to an approximate method. This section is concluded by
a consideration of the effect of a boundary with a sinusoidal
change of impedance.
2. The excitation of surface waves by an external source.
The question of excitation by an external source situated near a
dividing boundary is the subject of a whole series of papers.
Surface fields are in principle analogous to comparatively simple
problems such as the determination of fields inside a screened
transmission line: hence one is able to use well developed wave
theory methods. In practice a real source will excite a whole
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The use of the surface impedance   5/141/61/004/005/001/02?
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complex of other fields apart from the surface fields, forming the
so-called spatial waves weakly coupled to the guiding boundary.
3 The diffraction of surface waves. This question is discussed
in detail under a number of headings. It is shown that, as with
the study of free surface waves, the use of the impedance approach
is extremely effective. This permits the use of a series of
simple models for the elucidation of the basic characteristics of
practical systems.
4. Antenna systems. It is shown that one of the most useful
applications of the impedance approach is in the design of antenna
systems.
N.C. Neyman, G.D. Malyuzhinets, M.D. Khaskind, B.Ya. Moyzhes,
L.A. Vaynshteyn, Kuan-Ting-Hua, P.S. Mukazan and V.I. Bespalov
are mentioned in the article in connection with their
contributions in this field.
There are 5 figures and 227 references: 89 Soviet-bloc, 2 Russian
translations from non-Soviet-bloc publications, and 138 non-
Soviet-bloc. The four most recent English language references
read as follows:
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The use of the surface impedance ...   S/141/61/004/005/001/021
                                          E039/E135

Ref.18   A.F. Harvey.   IRE Trans., v.MTT-8 30 (1960).
Ref.20.   F.J. Zucker. Handbook of Antenna Engineering H Jasi:
          McGraw-Hill Book Co   1960.
Ref.21.   F J. Zucker   J.Res. NBS v 64D. 6 (1960).
Ref.72.   A.D Bresler,   IRE Trans.. v.MTT-8 81 (1960)

ASSOCIATION. Nauchno-issledovatel'skiy radiofizicheskiy insti:ru:
              pri Gor'kovskom universitete
              (Scientific Research Institute of Radiophysics a:
              Gor'kiy University)
SUBMITTED: June 27 1961

Card 6/7 0

33223
S/141/61/004/006/010/017
E192/E382

$9, i000 (1159)$

AUTHOR.   Talanov, V. I.

TITLE: Radiation of the sources situated above a plane with sinusoidally-modulated surface impedance

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Radiofizika, v. 4, no. 6, 1065 - 1076 /961/

TEXT: The aim of the paper is to investigate the field produced by simple sources placed above a plane with a periodically changing impedance in order to elucidate the mechanism of excitation of surface and quasi-surface fields and the role of these fields in determining the directional patterns of given sources   The system considered is illustrated in Fig. 1. where a magnetic-current filament I^m passes through the point $x = H$, $z = z_0$ and is parallel to the axis y. The plane $x = 0$ is characterized by the boundary condition

$$E_z = Z(z)H_y \qquad (1.1)$$

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Radiation of the sources . . . .

where

$$Z(z) = iZ_o \left[Q_o + Q_1 \sin(\beta\, kz) \right] \quad (Re\ Z = 0)$$

$$Z_o = \sqrt{\mu/\epsilon}, \quad k = \omega\sqrt{\epsilon\mu}, \quad \beta = 2\pi/kD$$

The field excited by such a source can be represented as a sum of the primary field

$$H_\Gamma = \frac{\omega\epsilon I^m}{4\pi} \int_{-\infty}^{\infty} e^{-i\varkappa|x|} H'\left[-ih(z-z_o)\right] \frac{dh}{\varkappa} \quad (1.2)$$

where $\varkappa = \sqrt{k^2 - h^2}$ and a secondary field H_B which is

dependent on the influence of the impedance plane on the field H_Γ. The secondary field can be represented in the form

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Radiation of the sources

$$
H_B = \int_{-\infty}^{\infty} \sum_{n=-\infty}^{\infty} a_n(h) e^{-ih_n z - i\varkappa_n x} \, dh \qquad (1.3)
$$

by taking into account the periodic structure of the boundary conditions on the plane $x = 0$. In Eq (1.3)

$$
h_n = h + k\beta n, \quad h_o = h, \quad \varkappa_n = \sqrt{k^2 - h_n^2}
$$

The fields expressed by Eq (1.2) and (1.3) will satisfy the radiation principle for $x \to \infty$ if the signs of the square roots in the epxressions for $\varkappa_n$ for all n are chosen so that the following condition is met

$$
\operatorname{Im} \varkappa_n < 0 \qquad (1.4)
$$

This is necessary for the convergence of the integrals
The integration contour in Eqs. (1.2) and (1.3) lies on the real axis, where the branching points of the sub-integral

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Radiation of the sources ....

functions are also situated. These are determined by the condition

$$\kappa_m = 0$$

The equations for the amplitudes of the spatial harmonics $a_n(h)$ can be obtained by substituting the sum of the fields H and H_B into the boundary conditions given by Eq. (1.1) and equating to zero the coefficients with the functions $e^{-ih_n z}$ ($n = 0, \pm 1, \pm 2, \ldots$) The overall field can be expressed by

$$H = H + H_{B_o} + \sum_{n=0} H_{B_n} + \sum_{n=0} H_{B_{-n}} \qquad (1.14)$$

Detailed expressions for all the components in Eq. (1.14) are given. These are used to evaluate the field of the surface wave $H^{(s)}$. The radiation field (at a comparatively great

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Radiation of the sources E192/E382

distance) is also evaluated and it is shown that this is in the form:

$$H(r) = \frac{\omega \varepsilon I^m}{2 \cdot 2} \cdot \frac{e^{-i(kR - /4)}}{kR} \cdot (h_o) e^{ih_o z_o} \qquad (3.2)$$

where (h_o) represents the directional pattern of the system. The expression for (h) is used to plot as a function of $\gamma_o = \cos$; The symbols R and in Eq. (3.2) denote the cylindrical coordinates. It is found from the graphs that the formation of highly directional radiation patterns by means of periodically-modulated impedance structures with suitably chosen parameters is due to the generation of localized surface or quasi-surface waves in the vicinity of these structures. It is therefore possible to use the expressions for the surface fields $H^{(s)}$ for determining the directional patterns not only of the localized surface waves

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but also in the case of quasi-surface waves which cannot be
excited (in pure form) under any realistic conditions.
There are 3 figures and 4 references: 2 Soviet-bloc and
2 non-Soviet-bloc. The two English-language references
mentioned are: Ref. 2: L.O. Goldstone, A.A. Oliney - IRE
Trans., AP-7, 4, 307, 1959; Ref. 4: A.L. Cullen, Proc.
IEE, p. 4, 101, 225, 1954.

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy
                institut pri Gor'kovskom universitete
                (Scientific Research Radiophysics Institute
                of Gor'kiy University)

SUBMITTED: March 24, 1961

Fig. 1:
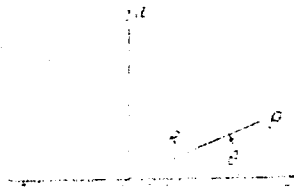
Card 6/6

BUTYRSKIY, I.I., inzh.; TALANOV, V.I., starshiy elektromekhanik

Vehicle-mounted reel attachment for winding wires. Avtom.,telem.
i sviaz' 5 no.5:28 My '61.   (MIRA 14:6)

1. Charskaya distantsiya signalizatsii i svyazi Kazakhskoy dorogi
(for Butyrskiy).
                    (Electric lines—Poles)

41406
S/141/62/005/004/004/009
E192/E382

24.2500

AUTHOR: Talanov, V.I.

TITLE: Field above a plane with nonhomogeneous surface
            impedance

PERIODICAL: Investiya vysshikh uchebnykh zavedeniy,
            Radiofizika, v. 5, no. 4, 1962, 721 - 735

TEXT: The paper was first read at the Scientific Session of
NTC im. A.S. Popov in Moscow in 1950. Some problems of electro-
dynamics and acoustics relating to the field of given sources,
situated above a plane, having a surface impedance $q(y, z)$, can
be solved by finding the solution of the wave equation:

$$\Delta \psi + k^2 \psi = -f \qquad (1.1)$$

which satisfies the radiation condition at infinity and the
boundary condition:

$$\frac{\partial \psi}{\partial x} + kq(y, z)\psi = 0 \qquad (1.2)$$

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Field above a plane ....

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at the plane $z = 0$ (see Fig. 1). In the above $\psi(x, y, z)$ is
a scalar function describing the field, $f(x, y, z)$ is a function
characterising the distribution density of the sources, and
$k = 2\pi/\lambda_0$, where λ_0 is the wavelength in the medium. It can
be shown that Eq. (1.1) leads to the following integral:

$$\psi(\underline{\varrho}) = \psi_0(\underline{\varrho}) + \frac{k}{4\pi} \int \left[q(\varrho') - a \right] \psi(0, \varrho') G(0, \varrho, \alpha\varrho') \, ds' \qquad (1.7)$$

where:

$$\psi_0(\underline{\varrho}) = \frac{1}{4\pi} \int_{V'} f(\underline{r}') G(0, \varrho, \underline{r}') \, dv' \qquad (1.8)$$

in which $\underline{r}'$ is the radius vector of the integration point
on the plane $z = 0$ and ψ_0 is the field of the source $f(r)$
on the plane with a homogeneous impedance $q(\underline{\varrho}) = a$.

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Field above a plane ....

Eqs. (1.7) and (1.8) are first employed to investigate the case of two-dimensional fields where the impedance is independent of the coordinate y and is a rational-fractional function of the type

$$q(z) = q_0 - \frac{p}{z - z_\infty} \qquad (2.1)$$

where q_0, p and z_∞ are constant parameters. The external field for the system is assumed to be in the form:

$$\Psi_n = e^{-ih_0 z + i\lambda_0 x} \qquad (2.3)$$

and this wave impinges on the plane $x = 0$ at angle θ, so that:

$$h_0 = k \sin\theta \qquad \lambda_0 = k \cos\theta \qquad (2.4)$$

The function $\Psi(x,z)$ is determined for the cases of $p < 0$ and $p > 0$. These formulae show that the field is formed by a superposition of plane waves in which the spectrum of the propagation constant λ is limited by the propagation constant λ_0 of the incident wave (from below for $p < 0$ and from above

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Field above a plane ....

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for $p > 0$). The reflected field is thus scattered in all directions contained in the angle between the mirror-reflected ray and the direction of the predominant impedance increase. The case when the impedance is a linear function given by:

$$q = q_1 + p_1 \cdot z \qquad\qquad (2.22)$$

is also considered. The field in the vicinity of a plane with such a linear impedance is shown to consist of a field primarily dependent on the local reflection coefficients and a surface field which is different from zero only above those areas of the plane where the impedance is positive. The directional pattern of the sources situated above a plane whose impedance is in the form described by Eq. (2.1) is also determined and it is shown that the surface waves play a substantial part in determining the directivity. In particular, the surface fields determine the directivity of an isotropic radiator situated above a plane with a positive but monotonically decreasing surface impedance. There are 3 figures.

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Field above a plane S/141/62/005/004/004/009
                                  E192/E382

ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy
                 institut pri Gor'kovskom universitete
                 (Scientific Research Radiophysics Institute of
                 Gor'kiy University)

SUBMITTED: December 7, 1961

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S/141/63/006/001/006/018
E140/E135

AUTHOR: Talanov V.I.

TITLE: On aperiodic solutions of the field equation at the
            edges of the passbands of sinusoidally modulated
            unshielded impedances

PERIODICAL: Izvestiya,vysshikh uchebnykh zavedeniy, Radiofizika,
            v.6, no.1, 1963, 65-73

TEXT: · It is shown that at the edges of the passbands of
unshielded sinusoidally modulated impedance structures, along with
a periodic solution of the field equations, there exists for the
surface wave an aperiodic solution analogous to the solution of a
Mathieu equation. The practical interest of the problem is that
it is possible to reduce to this the analysis of the operation of
an antenna with periodically modulated surface impedance,
radiating along the normal to the delay structure.
There are 3 figures.
ASSOCIATION: Nauchno-issledovatel'skiy radiofizicheskiy institut
            pri Gor'kovskom universitete (Scientific Research
Card 1/1   Institute of Radiophysics at Gor'kiy University)
SUBMITTED: July 11, 1962

L 10112-63
ACCESSION NR: AP3003399

S/0142/63/006/003/0308/0311

44

AUTHOR: Koshelev, V. V.; Talanov, V. I.

TITLE: Automatic optimization of ferrite switch characteristics

SOURCE: IVUZ. Radiotekhnika, v. 6, no. 3, 1963, 308-311

TOPIC TAGS: ferrite switch, automatic optimization

ABSTRACT: An optimum-seeking circuit is proposed for use with ferrite switches
in microwave applications. The circuit is a feedback system which senses and
corrects the magnetizing current for deviation of the optimum ferrite attenuation
characteristic, due to incident r-f frequency drift, temperature effects on the
ferrite, etc. This is done by superimposing a low frequency threshold signal on
the d-c magnetizing current, such that with sufficient drop in ferrite attenuation
this low frequency will appear as a modulation of the passed radio frequency. The
latter is detected and any low-frequency modulation is recovered as an error signal,
which is treated to return the d-c magnetizing current to the optimum value. The
circuit uses a phase detector to give directionality to the error signal; the
latter feeds to the grid of the output-controlled rectifier, whose load is the
ferrite magnetizing coil. Operation with the automatic tuning described was

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ACCESSION NR: AP3003399

compared to operation without it in a two-channel system in the 3-cm band. The
comparison showed that a normal channel isolation of 20--30 db is deteriorated on
the average by only 3--4 db as a result of tuning circuit effects. In the
experiment the emphasis was on qualitative results without striving for the best
response time; e.g., the low-modulating frequency used (330 cps) resulted in a
loop response of only 5 or 6 cps, which could be improved with higher modulating
frequency and tighter loop response in general. A limitation cited is the minimum
r-f power required for error detection, which precludes its use in some radar
receiving modes. Orig. art. has: 4 figures.

ASSOCIATION: NIRFI pri gos. universitete im. N. I. Lobachevskogo (NIRFI at
State University)

SUBMITTED: 07Feb62 DATE ACQ: 02Aug63   ENCL: 00

SUB CODE: 00   NO REF SOV: 002   OTHER: 000

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S/0141/64/007/002/0313/0327

ACCESSION NR: AP4039732

AUTHOR: Bondarenko, N. G.; Talanov, V. I.

TITLE: Some aspects of the theory of quasi-optical systems

SOURCE: IVUZ. Radiofizika, v.7, no. 2, 1964, 313-327

TOPIC TAGS: quasioptics, waveguide propagation, waveguide diffraction, mirror configuration, wave field, diffraction analysis

ABSTRACT: In order to find a unified approach to the analysis of quasi-optical systems, the diffusion approximation is used to describe wave beams in such systems and to determine the laws of conversion of wave beams by infinite-plane field transformers. Some general laws of propagation of wave beams are derived with the aid of wave beams and with the aid of geometrical optics, and it is shown that the problem of existence of stable (periodic) configuration of wave beams in a specified sequence of converters can be solved on the basis of a purely geometric analysis of the passage of a light beam through a system. A configuration of wave beams that ensures the transfer of energy between two specified apertures of converters with minimum losses is derived. The connection between such optimal configurations and the field distributions in beam waveguides and resonators is investigated.

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EWT(d)/EWT(1)/EWG(k)/EPA(sp)-2/EEC(k)-2/EEC-4/EPA(w)-2/EEC(t)/
T/EEC(b)-2/EWA(m)-2/EWA(h)   Pn-4/Pz-6/Po-4/Pab-24/Pg-4/Pt-10/Pi-4/Pl-4
IJP(c)/AFETR/RAEM(a)/ASD(a)-5/AS(mp)-2/AFMD(t)/ESD(dp)/ESD(gs)/ESD(t)/RAEM(t)

ACCESSION NR: AP4044113   AT/WS   S/0141/64/007/003/0564/0565

AUTHOR: Talanov, V. I.   134

TITLE: On the self focusing of electromagnetic waves in nonlinear media

SOURCE: IVUZ. Radiofizika, v. 7, no. 3, 1964, 564-565

TOPIC TAGS: waveguide propagation, plasma electromagnetic wave, electromagnetic wave focusing, transverse wave, dielectric constant, propagation constant

ABSTRACT: Using as an example an isothermal equilibrium hydrogen plasma in a monochromatic field, the author demonstrates that the action of a strong high frequency field on a plasma causes a redistribution of the electron and ion densities, in accordance with the field amplitude, and that this in turn can lead to self-focusing of the electromagnetic waves. Traveling two-dimensional TE waves are

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ACCESSION NR: AP4044113

considered in a medium having a dielectric constant given by

$$\varepsilon = \varepsilon_0 [1 - q^2 \exp(-|E/E_p|^2)]$$

(E -- electric field intensity). A characteristic equation is de-
rived, relating the propagation constant with the field amplitude at
the maximum of the wave. The condition under which the characteris-
tic equation has a nontrivial solution is determined. The resultant
field structure corresponds to the formation in the plasma of a
waveguide channel maintained by the action of the field itself. The
channel is produced for arbitrary wave power, the power level de-
termining the effective width of the channel and the structure of
the field in it. A similar analysis made for the case of TM waves
in the same medium leads to solutions of the traveling-wave type
with a field maximum in a finite region of space. Although the
generalization to three-dimensional fields entails great diffirul-
ties, in some cases the variables can be separated and a solution ob-

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ACCESSION NR: AP4044113   O

tained.   It is further shown that self-focusing waveguide channels
can be induced by a high frequency field in an arbitrary isotropic
medium, if it is assumed that the field produces an isothermal de-
formation that varies the density of the medium in proportion to the
pressure.   The effect of weak attenuation in the nonlinear medium on
the shaping and structure of the self-focusing waveguide channels
can be considered in limiting cases by the usual energy balance
method.   Orig. art. has: 9 formulas.

ASSOCIATION: None

SUBMITTED: 25Feb63

ENCL: 00

SUB CODE: EC, ME   NR REF SOV: 002   OTHER: 001

Card   3/3

MILOVSKIY, N.D.; TALANOV, V.I.

Accuracy limit in measuring the angular coordinates of a source using multielement antennas. Radiotekh. i elektron. 9 no.9:1605-1610 S '64.

(MIRA 17:10)

ACCESSION NR. AP4031189   S/0056/64/046/004/1500/1502

AUTHOR: Bondarenko, N. G.; Yeremina, I. V.; Talanov, V. I.

TITLE: Beam phase structure of a ruby laser

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 4, 1964, 1500-1502

TOPIC TAGS: beam phase structure, phase structure, ruby laser, ruby crystal, dielectric inhomogeneity, transparent dielectric, laser output analysis

ABSTRACT: An experimental method is described which makes possible a visual interpretation of the beam phase structure of any coherent oscillation. The method is based on the wave interference of the original beam and a partly scattered beam after it has passed through a dielectric transparent inhomogeneity whose dimensions are small enough in comparison with the beam width. The interference picture provides reliable information regarding the structural characteristics of a beam phase front. The scattered radiation at a distance $d \gg a^2/\lambda$ from an inhomogeneity (where a is the dimension of the inhomo-

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ACCESSION NR. AP4031189

geneity), represents a spherical wave whose phase center is located
in the inhomogeneity. Interference pictures were obtained at various
distances (75, 155, and 900 cm) from the external mirrors of a ruby
generator ($\lambda = 0.694\mu$) with a crystal 7.2 cm long and 0.6 cm in
diameter. The experimental results indicate the importance of this
method of phase measuring for the study of lasers. Orig. art. has:
2 figures and 2 formulas.

ASSOCIATION: Radiofizicheskiy institut gor'kovskogo gosudarstvennogo
universiteta (Institute of Radio Physics, Gorky State University)

SUBMITTED: 09Dec63   DATE ACQ: 07May64   ENCL: 00

SUB CODE: PH   NO REF SOV: 001   OTHER: 002

Card 2/2

L 9564-66   FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h)   SCTB, IJP(c)   WG/GG

ACC NR: AP5026098   SOURCE CODE: UR/0386/65/002/005/0218/0222

AUTHOR: Talanov, V. I. *44, 55*   *44, 55*   *69 67 B*

ORG: Scientific Research Institute of Radiophysics, Gorky (Nauchno-issledovatel'skiy radiofizicheskiy institut)

TITLE: Self-trapping of wave beams in nonlinear media

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 2, no. 5, 1965, 218-222   *21, 44, 55*

TOPIC TAGS: laser, nonlinear optics, self trapping, self focusing nonlinear dielectric *21, 44, 55*

ABSTRACT: A theoretical analysis is conducted of self-trapping of beams in an anisotropic slightly nonlinear dielectric using a quasi-optical approximation. The beam structure in the region of the maximum and the minimum of the field is analyzed for the special case of a spherical beam with a variable radius of curvature (geometric optics approximation). A solution is also obtained for the Gaussian type beams for both two- and three-dimensional cases. It is shown that when $P/P_{st} < 1$, where P is the beam power and P_{st} is the power of a stationary beam, the beam will always become untrapped. For $P/P_{st} > 1$, self-trapping will be achieved. It is pointed out that nonlinear energy absorption and dielectric breakdown will be achieved before the self-trapping can be terminated at very high intensities of the light beam. As a result

Card 1/2
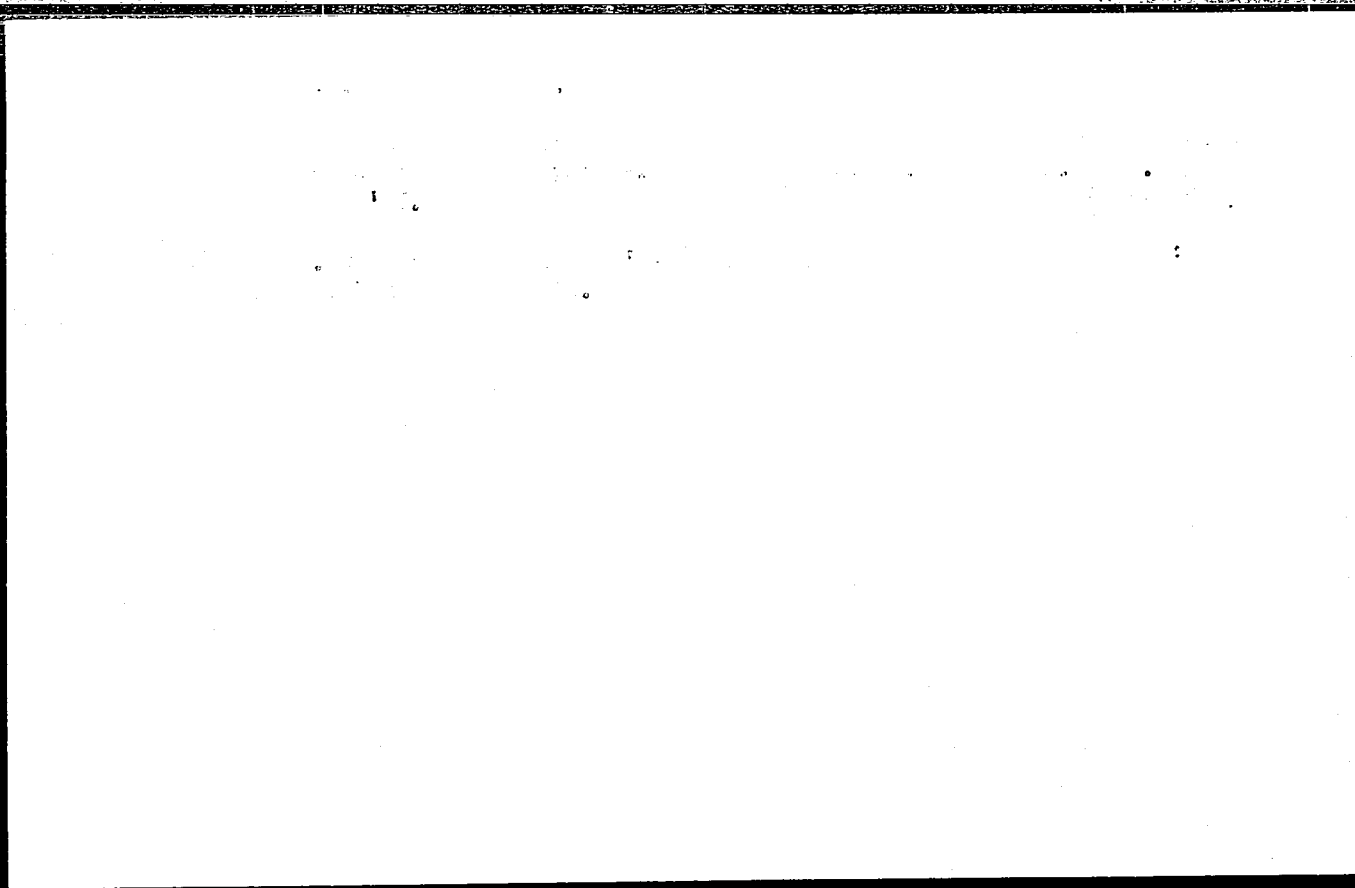
L 60165-65   EWA(h)/EWT(1)   Peb

ACCESSION NR: AP5014503

UR/0141/65/008/002/0260/0271
535.1

AUTHOR: Talanov, V. I.

TITLE: Operator method for describing wave beams in combined quasioptical systems

SOURCE: IVUZ. Radiofizika, v. 8, no. 2, 1965, 260-271

TOPIC TAGS: quasioptical system, wave beam passage, amplitude phase converter, quasioptical waveguide, quasioptical resonator, operator method

ABSTRACT: In view of the fact that quasioptical waveguides and resonators are frequently used as components of more complicated systems, the calculations for which are quite cumbersome, the author proposes to simplify the computation by using an operator method, and presents the fundamental equations for the operators encountered in the theory of wave beams. The operators included are the Green's function operator, the operator for the transformation of a single beam by an arbitrary converter, the Fourier transformation operator, the transverse beam displacement operator, the beam scale-transformation operator, and the operator of a diaphragm made of an ideally absorbing screen. The passage of a wave beam through the system of amplitude-phase converters constituting the quasioptical waveguide or resonator is described in terms of a series of linear operators corresponding to the individual elements of the system. The principal relations between these

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ACCESSION NR: AP5014503

operators are written out and it is shown by means of examples that they can be
employed to realize equivalent transformations of quasioptical systems and thus
facilitate their design. Although the examples were limited to phase converters
of the wave beam, the general relations derived can be used in the analysis of
systems of linear and quadratic amplitude-phase converters with complex parameters.
Orig. art. has: 6 figures and 47 formulas.

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